

I wish you were here – not!

The future of spatially separated sexual intercourse

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Abstract. In this paper we discuss how spatially separated sexual intercourse between humans might be realized in the future. Given by the anticipated progress with respect to the imitation of human interaction by robots, as well as in the areas of digital taste and scent technology, we present an imaginary future sex scenario with sex puppets allowing for the fully tele-operated presence of the partner on both sides. In the scenario the sex puppets conduct a bidirectional transmission of all body information available i.e. tactile, olfactory and auditory cues. Reasoned by the feasibility of this scenario in the near future this study discusses the attitude and concerns of people regarding such a future sex scenario as well as the possibility to gather such sensitive information by a focus group discussion. The results of the focus group discussions reveal that with respect to the development of teledildonics and robotic an ethnical discussion has to take place how these issues will alter our society.

1 INTRODUCTION

In 1991 Howard Rheingold predicted the future of how people will use teledildonics products, for sexual arousal and satisfaction:

“The first fully functional Teledildonics system will be a communication device, not a sex machine. You probably will not use erotic telepresence technology in order to have sexual experiences with machines. Thirty years from now, when portable telediddlers become ubiquitous, most people will use them to have sexual experiences with other people, at a distance, in combinations and configurations undreamed of by pre-cybernetic voluptuaries.” [1]

The recent understanding of teledildonics (aka cyberdildonics) is computer mediated cybersex sex toys that stimulate each genital or other parts of the body of two partners mutually and simultaneously [2]. Former technical trails (i.e. The FuckU-FuckMe Applikation² or Fundawear³) remained as a blueprint or are excluded to a broader clientele. This changed with the product announcement of LovePalz, which seems to be - reasoned by its success of selling 10.000 pieces – the first real teledildonics consumer product⁴. LovePalz transfers the intimate movements of two people via two remotely controlled devices Hera (for women) and Zeus (for man).

One open issue is whether such devices will be suitable to allow for a spatially separated sexual intercourse. Our goal is to find out whether the acceptance of these toys may fail due to their unrealistic behavior or feeling. Assuming that teledildonics are not only used for quick satisfactions, but rather as a realistic alternative for sexual intercourse in long distance relationships, it should integrate not only video and audio, but also channels such as body language, haptics, and smell. Consequently, we would need a teledildonics

device that is able to transfer, in the best case, all available body information. Fortunately, another invention of intimate relationship that favors this idea happens in the area of robotics, where robot girlfriends are examined [3]: robots who act realistic and have a realistic touch. Therefore we wanted to investigate whether it seems possible to combine recent developments in the field of robotics, human-computer interaction, and teledildonics for an anticipation of a future scenario for spatially separated sexual intercourse.

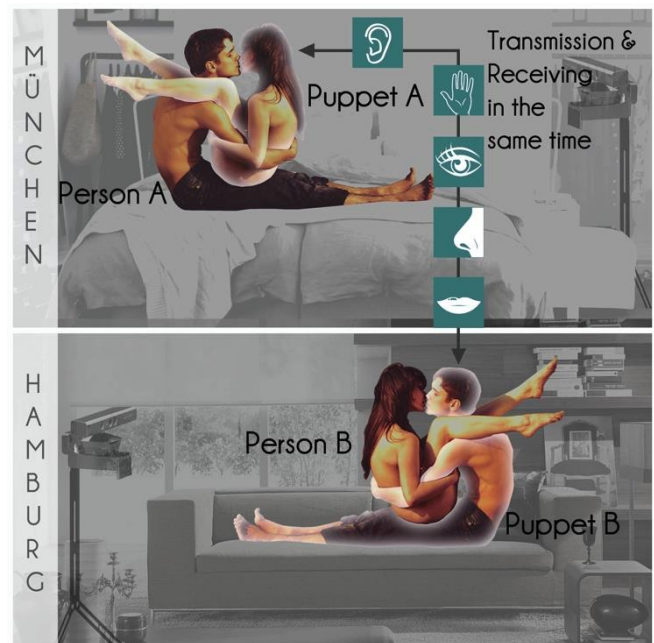


Figure 1. Sex Puppet Scenario Mock-Up. The sex puppets are connected via a network.

This paper proposes a scenario that might resolve the issues mentioned. Therefore each of spatially separated partners would have a sex puppet transferring all body information available (haptic/tactile, temperature, olfactory, auditory, etc.) (see fig. 1). This might also be described as a mechanic lookalike sex puppet that tastes, smells, moves, and speaks in the same way, in the same time as the partner does, who is located at a remote place. On both sides each of the partners controls a marionette-like puppet device by

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³ <http://www.durexperiment.com.au>

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acting with it in a way he or she otherwise would with her or his partner.

In this paper we will show the overall feasibility of such a scenario in the near future due to the recent progress in research on the imitation of human robot interaction, digital taste, and scent technology. Thus, it is not an uncertain science fiction concept anymore; there is a need to investigate how individuals and the society will deal with such opportunity. Moreover it is an open issue if there is a preference between the current and the upcoming development of teledildonics. Will people, who are in a long distance relationship, prefer the focus on a short term or on a long-term solution? In comparison to teledildonics, what would be the benefits and the concerns regarding such a sex puppet scenario?

For this study we exposed members of two focus groups with the actual and the upcoming teledildonics developments and discussed the given issues. The second section deals with the issues regarding current teledildonic devices and explains to which extent there is a different communication and exchange of sexual intercourse in order to set up a theoretical framework. The third section provides a deeper explanation of the sex puppet scenario showing its feasibility based on ongoing related work. Section 4 presents the results of the group discussions. Finally we will sum up our results and provide a look into future work.

2 TOWARDS A FUTURE SCENARIO OF SEXUAL INTERCOURSE

2.1 Cybersex and teledildonics

With the aim to set up a scenario about how future spatially separated sexual intercourse may look like, we will first investigate the impact regarding the usage of recently presented teledildonics devices. The theoretical approach shall provide the opportunity to predict the concerns and attitudes of the usage on the one hand and integrate these issues into the future sex scenario on the other hand.

According to Döring teledildonics can be seen as a kind of cybersex [2]. Cybersex itself is defined as a type of computer-mediated communication. As a broad definition we can use this as follows: "Cybersex is understood to be a computer-mediated interpersonal interaction in which the participants are sexually motivated, meaning they are seeking sexual arousal and satisfaction." [2]

As further researchers suggested, it is relevant to include the interpersonal interaction as an element of cybersex [4]. There is a difference between cybersex and human-computer interaction in general. Please note, that common behavior such as seeking for personal sexual satisfaction by searching for pornography on the Internet must not be mixed up with cybersex!

Based in the different media used for communication virtual reality-based cybersex, video-based cybersex, and text-based cybersex are distinguished. Text-based and video-based cybersex describe sexually motivated exchange either via chat or video conferencing. Virtual reality-based cybersex may include the usage of teledildonic devices and is denoted by Döring as "entering into a three-dimensional, audiovisual and tactile virtual reality via a full-body data suit and data helmet, expressively for the purpose of cybersex" [2]. As mentioned earlier in this paper, devices such as LovePalz transferring tactile cues while typically focusing on certain areas (in particular the genitals) are advertised as teledildonics and therefore are deemed as such.

Up to now research in general or even reports about the experience with teledildonic sex toys are rare or even not existing [2]. There is also a lack of research in the area of intimate human-computer interaction. While design studies and approaches for long distance-relationships were conducted, the specific aspects of cybersex [5] were widely ignored. However, the long distance interaction system by Adrian Cheok and his team enhancing the remote transmission of tactile cues from a human to a poultry by a network connection may be considered here. In their study the researchers state a possible further application of their system for human-human interaction using wearable computer jackets [6].

Because of the relation between cybersex and teledildonics - as discussed above - insights from studies about text-based and video-based cybersex are applicable for the theoretical framework of this paper.

2.2 Limitations of teledildonics

With the aim to analyze the impact of cybersex to interpersonal relations, Mantovani applied the social presence theory on the computer-mediated communication of cybersex [7]. Social presence measures how well a medium transports the "presence of the communication participants" [8]. Therefore it provides appropriate dimensions to evaluate a medium. The dimensions are verbal features of the exchange, vocal, nonverbal cues, body language and context [9]. With the aim to evaluate the sex puppet scenario, these dimensions may be utilized for the present study. In his findings Mantovani stated that social cues such as gestures, body language, facial expressions, and appearance are reduced in the computer mediated communication of cybersex [7]. Based on this reduction new forms of (mis)communication emerge, which explain the attraction of cybersex: indirectness, "say not to say" and "obliquity" [7].

Similar findings were made by Rodney [10]. By analyzing the impact of text in video-based cybersex (without audio transmitting) he argued that the communication of social cues is postponed in cybersex as well. Verbal messages in conventional face-to-face communication between the partners as part of a sexual intercourse delivers the "ideational meaning" (i.e. thoughts) whereby the major communication is provided by means of body language (expression of the face and the body). In contrast to this, for cybersex pictures deliver the "ideational meaning" and the text chat is required to communicate the interaction. Thus, these two studies assume that with the use of teledildonics a shift regarding the importance of social cues as well the emergence of new forms of communication will take place. Therefore we argue that in comparison to the sex puppet scenario, which will be introduced in the next section, people may either be concerned or motivated by these dimensions. However, it will play a crucial role for the evaluation of both. Moreover the objections regarding teledildonics reveal the need for an extension of cues for a fully immersive presence of the partner allowing for a realistic (or at least providing a sufficient amount of reality) spatially separated sexual intercourse.

2.3 Anticipated technological progress

In this paper we propose a future scenario for spatially separated sexual intercourse. As explained before, the scenario draws its idea from potential progress of teledildonics products, robotics, and sensors and is designed for partners in a long distance relationship.

In contrast to current teledildonics products, the sex puppet anticipated for this future scenario, is supposed to be able to transfer all body information it is exposed to and display all information transferred from the remote counterpart. Finally, the life like puppet of each partner shall perfectly resemble the other partner, allowing for his or her presence over a distance.

While the idea of using an android counterpart for sexual intercourse of spatially separated partners seems to be unexamined [4, 5] other similar research areas as human-robot interaction with the focus on robots providing sexual pleasure for humans have already been investigated [11]. However, in contrast to our approach, scenarios dealing with love and sex with robots rather have to deal with issues such as artificial intelligence, sensory perception, synthetic physiological responses, and affective computing [11], which do not need to be considered here.

The studies on the Geminoid HH1 by Hiroshi Ishiguro and his team showed the outstanding effort which would be required to design and realize a sex puppet [12]. The Geminoid prototype is a robot counterpart of his inventor using tele-operated technologies for remotely controlling motion and speech. Therefore, a motion capturing system measures the movements of an operator, sending them via a computer network to the Geminoid. Further research will be conducted on capturing the movement of the eyes as well as other body language aspects [12]. Hence, a humanlike impression regarding appearance and behavior is given without the deployment of artificial intelligence. Former studies by Ishiguro demonstrated how androids achieve a humanlike appearance [13]. Based on surface data from a real person a silicon skin was manufactured. Further, realistic movements were realized by 42 pneumatic actuators building the skeleton of the android. Beside larger body movements of the arm also details such as facial expression can be realized. Currently evolving 3D scanning and printing technologies may support the fast and easy replication of the skin of an existing person in the near future. Obviously – even though there is some progress towards a realistic appearance and behavior – challenges remain, for example the implementation of all mechanic and processor work into a “mobile, self-contained robot platform” [14]. Currently, the geminoid HH1 is unable to walk; it is fixed to a chair, all built-in actuators are solely used for movements of the arms, torso and face [12].

To facilitate the full telepresence of a partner all body information available has to be transferred. This means at the same time that all information that can be perceived by all senses has to be captured, transmitted, and displayed. While tactile, visual, and auditory cues may already be transmitted applying the technological approaches introduced above, additional approaches are required to support olfactory and gustatory cues.

The digital taste simulator by Adrian Cheok and his team allows the realization of different taste stimuli (by now sour, salty, bitter, minty, spicy and sweet) via a tongue device [15]. The technology also includes thermal stimulations. In other studies the researchers established a communication system transferring desired preconfigured taste stimuli from a mobile application to the taste simulator [16]. The researchers outline that the transmitter side can be exchanged by an electronic tongue but further research seems to be required. However, e-tongues as well as e-noses were also examined by other researcher [17]. While the aim of the digital taste simulator is to function as a communication device enabling an immersive experience, it also suggests the future development of transferring taste as anticipated by our sex puppet scenario. Other researchers work on the transmission of olfactory cues [18].

2.4 The sex puppet scenario

The combination of human robot interaction, digital taste, and scent technology makes the proposed sex puppet feasible. While the introduced technologies mostly work with separated transmitters and receivers, the sex puppet has to incorporate both at the same time, allowing for a synchronous communication. The bidirectional transmission of information represents another challenge of the scenario. Network latency [12, 14] appears to be another critical issue in this context.

A simple kiss provides a good example here. Imagine a couple in a long distance relationship (Person A and Person B) each having a sex puppet as a counterpart of their partner (Puppet A and Puppet B) where the puppets are connected to each other via a network. Here, Person A is interacting with Puppet A and Person B with Puppet B. If Person A conducts the action of a kiss, Puppet A receives the information (including movement, taste, smell etc.) and sends the information to Puppet B where at the same time Puppet A requests from Puppet B the needed information of Person B (i.e. How does the partner’s kiss taste?). While Puppet B is conducting the kiss, she receives this information simultaneously and sends it back to Puppet A (see figure 2).



Figure 2. Bidirectional transmission of information

As both local pairs (each consisting of a real person and a puppet) have to behave in exactly the same way, they have to be encompassed by a pretty similar environment. For simplification, areas common for the sexual intercourse such as a bed may be assumed.

2.5 Acceptance issues

In this study the proposed scenario and recent teledildonics products are evaluated by two focus groups. As mentioned earlier there is lack of studies that consider the combination of human-robot interaction and cybersex. Since the idea of the sex puppet scenario is a fictional prediction the missing research appears reasonable.

The Geminoid studies by Ishiguro and his team also dealt with issues of the “uncanny valley” [13], which may arise in the focus group discussion about the sex puppet scenario as well. The uncanny valley describes the point when the appearance and movements of an android becomes too humanoid. While an anthropomorphic android or character clearly not human seems to be acceptable, observers suddenly feel awkward towards humanoid androids. This situation appears when the distinction between a human and the robot is only hardly recognizable by a few indicators [19]. The researchers assume that a nearly perfect human lookalike of a robot is interpreted and treated as a human and therefore “the subtle difference creates a strong strangeness” [13]. As further studies with the Geminoid HH1 expose, participants did not identify the HH1 as an artificial robot in

the first contact, while during the subsequent exposures, they were getting irritated communicating with the android [12].

Another ethical aspect is mentioned by [20] presenting "Kissinger" "an interactive device that provides a physical interface for transmitting a kiss between two remotely connected people" [20]. The researchers concluded in their study that, the long-term use of the device may have an impact on real life interchange between the partners. Moreover they raised the question if the usage of the device with other people than the partner might be considered as betrayal.

3 METHODOLOGY

With the aim to evaluate the proposed sex puppet scenario with respect to the recent teledildonics products our research was focused on the following research question: In comparison to teledildonics, what would be the acceptance and the concerns for this future sex-scenario?

Since the attitude towards both cases does not seem to be predictable and future developments remain an open issue, an explorative approach was chosen for this study. Rather than pushing imagined reactions into hypotheses that need to be proven, a deeper insight on different points of view regarding the acceptance and concerns had to be determined. Therefore focus group discussions seemed to provide the best opportunity to gather information and identify dimensions influencing the attitude regarding the sex puppet scenario and teledildonics.

3.1 Focus group discussions - Opportunities and risks

As a qualitative method, a focus group discussion is defined as a "carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment" [21]. These discussions enhance the opportunity of the participants to discuss and reflect their attitudes. Compared to individual interviews participants are typically more aware of their opinion and reflect them in a social situation due to the attendance of the other participants.

Some literature states that focus group discussion are not applicable for highly sensitive topics, as given in this case. The reason is that individuals may tend to provide socially desirable answers or answers only given to achieve conformity within the group [22]. However, several studies identified provisions to avoid such effects, some of them will be discussed below.

First there is a significant influence of the moderator on the progress of the discussion. By encouraging silent and calming down dominating participants he is able to keep the discussion [23] balanced. Furthermore, participants must not be pushed to create a group decisions on a general conformance. It is also helpful to ask indirect questions to give the participants the free choice to which degree they want to respond personally [24].

Another major aspect is the opening strategy, by which conventions and rules are set up in the beginning of each discussion. This ensures the awareness of the envisaged level of self-disclosure. Beside the invitation of sharing personal opinions, it also assures the confidential discourse inside the group [24]. Another aspect that was addressed to the group in the present study deals with the sex puppet

scenario. Since the scenario was presented in a video and - obviously - not a real life demonstration, the participants had to use their imaginative power. Therefore, the fact that neither right nor wrong opinions could be given was emphasized.

According to a study [25] that compared two different focus group projects, the general attitude towards the topic (in the current case sexual issues) influenced the willingness of self-disclosure. Therefore participants that previously had negative experiences towards the topic felt uncomfortable with the discussion about it. Consequently, a pre-target selection done by a screening questionnaire or a personal interview has to be done to choose participants that are aware and willing to share thoughts on sexual topics [24]. A further positive issue coming along with a the pre-target selection is that the participants are aware of the topic they contemplate beforehand and contribute more ideas.

Thus, a discussion on sensitive topics is possible using focus groups by considering the opening strategy, the behavior of the moderator, as well as a pre-target selection of people who were aware and willing to speak about this topic [24].

3.2 Sampling

In order to provide additional insight from a gender perspective, the chosen sample was divided into two homogenous groups of each four female and four male participants. As mentioned before, a screening was conducted along with the invitation. Beside the criterion of the awareness and willingness to discuss a sexual topic, another bias aspect was the condition that participants had to have experience in an adult relationships before.

In total the two homogenous groups included five students from the Ilmenau University of Technology and three from the University Erfurt with the age from 22 to 32 years. A variety inside the groups was achieved by the individual subjects of study of each participant. The students were distributed as follows: two business administration, two media and communication science, two educational science, one engineering, and one computer science.

3.3 Data collection and analysis

Both discussion sessions were held in December 2013 in Ilmenau. With the aim to cover all named research goals of the research question, a semi-structured interview guideline led both discussions through the following agenda:

Introduction: As mentioned before, this part consisted of the carefully prepared opening strategy. Beside the convention to ensure the envisaged level of self-disclosure, the participants were reminded about common rules for a polite discussion. To avoid uncertainty about the camera recording, which was necessary for the data collection, confidential and anonymous handling with the recorded material was insured. Moreover, to provide a comfortable and familiar atmosphere the participants were introduced to the topic in general, the agenda as well as to the moderator and to the other participants.

Teledildonics: After an icebreaker question, the participants were introduced to a current teledildonics product represented by a LovePalz advertisement⁵. Afterwards, the attitude and concerns about that invention were discussed.

⁵ <http://www.youtube.com/watch?v=xdEQ8Z0iWS0>

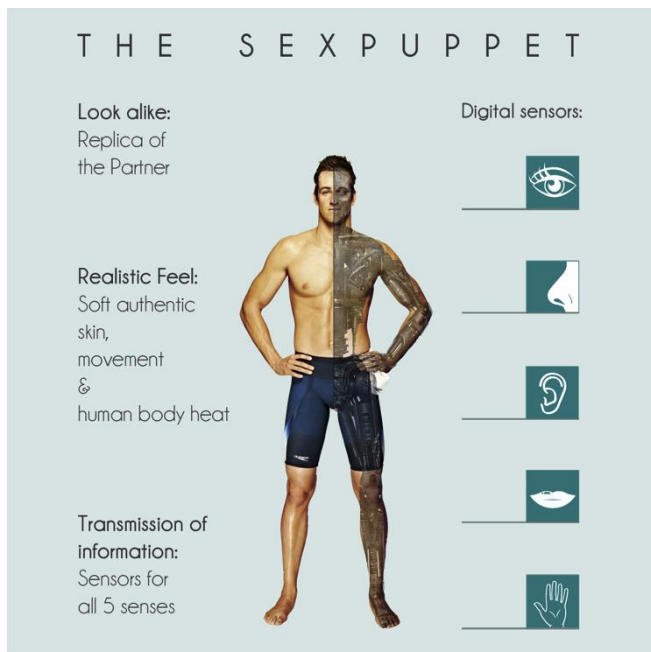


Figure 3. Visualization of the sex puppet for the focus groups

Sex puppet scenario: In order to provide a full understanding of the sex puppet scenario, we produced video material explaining the scenario, illustrated by the pictures shown in this paper (see fig. 1 and 3), enhanced by a voiceover. After the discussion of the overall attitude and concerns towards the scenario, the participants were encouraged to compare both scenarios personally.

For further analysis the recorded material with a length of 90 minutes each was transcribed by the program F4. Thereby the transcription system of Kuckartz was applied providing a basic transmission of the material into a discussion script by ten simple rules [26]. Thus, spoken German was transferred into written German (High German) ignoring dialects etc. to simplify the further process. Finally, we applied the method by Mayring for analyzing the discussion script [27]. Therefore, deductive main categories (as attitude and concerns) are specified by the most appropriate quotes (anchor quotes). Then, related argument quotes were merged to these categories and further subcategories. Equally inductive categories, which emerged during the discussion, get collected in the same way. In doing so, a functional interpretation with main trends and variations by the categories evolves. Further, the software MaxQDA was used for the analysis [26] providing an improved overview as well as the possibility to link different categories.

4 RESULTS AND DISCUSSION

In the following part we present and discuss the reaction and attitude toward the teledildonics product LovePalz and the sex puppet scenario as well as the comparison between both. Overall we observed a different acceptance of the teledildonics product between the male and the female group. Furthermore the participants struggled with the imagination of the future scenario in respect of the missing distinction between a sex puppet and a real human.

4.1 The teledildonics scenario

The initial reaction of the male group after presenting the advertisement of LovePalz was overall negative. In the first place one participant explained his disbeliefs as follows: „All things around, one actually looking forward to, are missing“, referring to the body, the kissing, etc. what is according to him belonging to a sexual intercourse. Even though two participants already had experience in long distance relationships they argued that the anticipation of the partner is an important aspect and the search for sexual pleasure could not be replaced by a teledildonic device. However, deduced from their statements, nobody of the group members had experience with such a sex toy. Also other negative arguments included the cheap and cold design as well as the reduction of the shared activity to the sexual intercourse.

Nevertheless, over the time one male person was stating that he could imagine an additional compensation for a long distance relationship by this product, although he claimed that he would not prefer it personally. Another participant was also considering teledildonics as an additional benefit for “a short fun beside normal sex” considering space for imagination while using it. However, the negative attitude remained superficial as the following dimensions of usage and impact on the society confirm: the most concerned aspect was regarding the danger of sex replacement: „I think it’s dangerous if it is drifting more and more in this virtual world. [...] After that you can stay at home, directly.“ Pointing towards the development in Japan – where the group assumed a higher usage of cybersex – they showed concerns that if people are getting used to teledildonics, it will replace traditional face to face sexual intercourse.

Even though the group was sure that the product would have a market and an economic success, they classified possible users rather in the fetish milieu, stating that the reputation of the toys first would have to change in society for a wider acceptance. This however, is a common process, which can be observed with most inventions and in particular with issues related to sexual behavior (e.g. introduction of the birth control pill, consumption of porn, acceptance of homosexuals, etc.). As a possible further usage scenario the male participations described the application of LovePalz in a network with strangers as “Fuckbook” or “Crowdsexing”.

On the contrary, the female group had an overall positive reaction on LovePalz. Described as “a good idea” and a “good thing in between”, the female participants stated that it could be satisfying. Although nobody had any previous knowledge about the product, they mentioned the advantages “to keep in touch” with his partner at home as well in a long distance relationship. Negative aspect that were mentioned focused on the missing body language: As an example a participant described the missing possibility to “slow down the partner” in his movements with her arms without saying anything during a real life intercourse. She was concerned that, on the virtual discourse with LovePalz this control was missing. Another negative dimension were technical concerns: “What if the Internet connection slows down?” or „What if they mix up the [network] connections?“ were discussed by the participants. Asking the participants directly about the usage they also identified the fetish market. Similar to the male group before, the female group also imagined a LovePalz Network with strangers as well.

The results revealed gender specific differences regarding the evaluation of teledildonics. Although both groups mentioned positive as well as negative aspects, the rather positive attitude

towards teledildonics of the female group is recognizable. This may depend on the general greater willingness towards using sex toys by females [28, 29], although this could only hardly be interpreted from the current data. However, the elaborated theories on teledildonics regarding the shift of the importance of social cues and the new forms of communication were confirmed in the discussion. Therefore coherence between computer-mediated communication of cybersex and teledildonics seems plausible. Nevertheless, before we can speak about a ubiquitous usage of teledildonics products as Rheingold [20] predicted, a significant change regarding the social acceptance—at least according to the participants—has to take place.

4.2 The sex puppet scenario

Since in the first part of the group discussion the people were concerned about the missing body language, one could assume that the reactions towards the sex puppet scenario were more positive since all body information gets transferred. However, the first reaction of both groups can be described as hesitant or aloof up to depreciate. First of all participants were astonished by the scenario, what seems reasonable. But even after the group discussed the scenario thoroughly, the key word during the evaluation was: “gross”. „I can imagine that there will be a robot one can have sex with in the future. [...] But the idea to have a long distance relationship [...] and a puppet in your cupboard! I can't imagine that...“

While everybody agreed that the scenario isn't just a science-fiction idiosyncrasy and that there is a conceivable chance it may be available in the near future, the participants were slightly scared by the thought. One female participant tried to explain it as follows: „What scares me most, is the knowledge that you're not sleeping with a real human, you just interact with a human who isn't present.“ We observed that the participants struggled with the imagination of a full representation by a remote partner. Frequently, the argument of a “missing soul” were given, even though the mechanic sex puppet couldn't have one at all and actually does not need one either as it just reflects the state of the remote partner. Perhaps, this can be interpreted as follows: if a person imagines a robot who behaves and appears as a human in all its particulars, he can only accept it as a human. On the other hand the participants mentioned the fear whether the difference between a human and a sex puppet may no longer be recognizable. „It has something to do with authenticity. What is reality? When is a human truly beside you?“ The concerns applied to most participants in both groups, when they figured out, that the sex puppet could be used in other cases as well, since it simply enables the presence of a remote partner, i.e. to huddle up against the sex puppet for spending the night together. They concluded that the unusual setting has to be discussed in society. Hence, nobody could answer how to deal with such concerns.

Other concerns mentioned of the participants were related to ethical issues as the withdrawal or entire replacement of the sexual intercourse between real humans. Furthermore, the female group discussed how the contact with family, children or friends has to take place. Also privacy issues were mentioned by the women (since one is not able to recognize if other people are present in the room) as well as the possibility of a virtual abuse. While considering the actual conduction of the sexual intercourse with the sex puppet, one female participant noticed, that a loss of spontaneity could happen: “It is already difficult to arrange a skype conference!” Further on, problems with the end of a relationship came up. Both groups

mentioned technical issues, such as a stable network connection between the puppets, because a failure might feel like the death of the other person. Solely, the male group made a point regarding the costs of the puppet.

Beside the high amount of concerns, some positive arguments were given on demand: “It's a great advantage if you can transfer [...] smell and taste as well. This would improve cybersex, significantly” and “Such a puppet does release hormones, what maintains a relation. [...] This wouldn't work with a toy”. Also the use for therapeutic treatments was mentioned. However, only a few positive arguments were provided.

The evaluation of the sex puppet scenario aligns with the theories of the uncanny valley [13, 19]. In this case, the point raises not only whether the distinction between human and robot is only recognizable by a few indicators, but also if the difference is detectable at all. Having a perfect copy of a human regarding appearance and behavior, people seem to accept that they deal with a human even knowing that the human actually is a robot. This side (the far side) of the uncanny valley has to be further examined in the future.

4.3 Comparison

By asking the participants which one of the scenarios they would choose, the male group rather disinclined on both: “From an emotional perspective, the second scenario would be easier, even though both would be nothing for me.” Another male expressed this even clearer: “I can't imagine that even one of these would make a long distance relationship better”, what sums up the attitude of the male group in the end.

The female group came up with distinctive positions: “Personally I would prefer the puppet – even though, it is a crazy thought – because the connection to the partner is much stronger then with LovePalz.” and “I would choose the first one. [...] I would never replace my partner! Not even for in between.” These different point of views give no deeper explanation for the scenario but they substantiate the appropriate choice of the method. Overall, the lively discussion and the representing of different point of views by the participants let us assume that they felt free for self-disclosure without any or at least any significant group pressure.

5 CONCLUSION AND FUTURE WORK

In this paper we presented two scenarios of how spatially separated sexual intercourse might be realized in the future, with respect to the actual and future development in robotics. Given the anticipated progress with respect to the imitation of human interaction by robots, as well as in the areas of digital taste and scent technology, we present an imaginary future sex scenario with sex puppets allowing for the fully tele-operated presence of the partner on each side. In the scenario the sex puppets conduct a bidirectional transmission of all body information available i.e. tactile, olfactory and auditory cues.

Since the scenario draws its idea from recent as well as potential progress of teledildonic products, a focus group discussion was deducted to evaluate the sex puppet scenario in comparison to teledildonics. The results showed that the chosen method was appropriate even for this sensitive topic by the means of a lively discussion with individual points of view and a free exchange of ideas by the participants. Therefore we assume that the opening

strategy, the behavior of the moderator, as well as a pre-target selection of people, which were aware and willing to speak about a sexual topic, had a significant influence on the process of the group discussion.

The overall results revealed a quite positive attitude towards teledildonics by the female group. In contrast, the male group was concerned by the lack of the full body, regarded as absolutely necessary for full sexual pleasure. Interestingly, both groups had more concerns regarding the future sex scenario than positive associations. While provided with an introductory animation, most participants seem to have difficulties in fully imagining the overall scenario. Nevertheless all participants agreed that there is a high likelihood that this scenario will actually happen in the near future. Other negative aspects mentioned were privacy, control, and the danger of an entire replacement of the sexual intercourse between real humans.

The results extend the theory of the uncanny valley, since the participants were mostly irritated and concerned that they might no longer be able to distinguish between a real human and a puppet. Although it was not entirely clear whether they were concerned by this fact or the insight that they might not behave in a different way towards them themselves. This seems to indicate that there is plenty of room for further research investigating into those aspects of the uncanny valley. Therefore our society has to become aware that the amalgamation of humankind and androids is inevitable and start to think (and discuss) about its implications. Further social research has to be done to outline how these issues can be resolved. Additionally, it will have to be examined how younger and elder people differ in their acceptance of teledildonics.

In 1991 Howard Rheingold predicted that in “thirty years [...] portable telediddlers become ubiquitous”. So far it seems to fail on social acceptance. But this may actually change within the remaining seven years ...

REFERENCES

- [1] H. Rheingold, *Teledildonics and Beyond*, 345-377, Virtual Reality, Summit Books, New York, 1991
- [2] N. Döring, ‘Feminist Views of Cybersex: Victimization, Liberation, and Empowerment’, *CyberPsychology and Behavior*, **3** (5), 863-884, (2000),
- [3] Frank Lake, *Robot girlfriends on sale in japan*. <http://weeklyworldnews.com/headlines/20090/robot-girlfriends-go-on-sale-in-japan/>
- [4] K. Daneback, A. Cooper, & S. A. Månsson, ‘An Internet study of cybersex participants’, *Archives of Sexual Behavior*, **34**, 321-328, (2005).
- [5] O.W. Bertelsen, and M.G. Petersen, ‘Erotic Life as a New Frontier in HCI’, *Proc. of British HCI 2008*, British Computer Society, 7-10, (2007)
- [6] Ping Lee, David Cheok, Soon James, Lyn Debra, Wen Jie, Wang Chuang, and Farzam Farbiz, ‘A mobile pet wearable computer and mixed reality system for human–poultry interaction through the internet.’ *Personal Ubiquitous Comput.* **10**, **5**, 301-317, (2006).
- [7] F. Mantovani, *Cyber-attraction: The emergence of computer-mediated communication in the development of interpersonal relationships*, 229–246 Say Not to Say: New Perspectives on Miscommunication, L. Anolli, R. Ciceri, and G. Riva (eds.), IOS Press, Amsterdam, 2001
- [8] J. Short, E. Williams, and B. Christie, *The Social Psychology of Telecommunications*, John Wiley & Sons, New York, 1976
- [9] R. E. Rice, ‘Media appropriateness. Using social presence theory to compare traditional and new organizational media’, *Human Communication Research* **19**, 451-484, (1993).
- [10] J. H. Rodney, ‘The role of text in televideo cybersex’, *Text & Talk* **28–4**, 453–473, (2008).
- [11] D. Levy, *Love and Sex with Robots*, p.68, HarperCollins, New York, 2008 quoted after S. Gutiu, ‘Sex Robots and Robotization of Consent’, We Robot Conference, 2012 http://robots.law.miami.edu/wp-content/uploads/2012/01/Gutiu-Robotization_of_Consent.pdf
- [12] S. Nishio, H. Ishiguro and N. Hagita, *Geminoid: Teleoperated Android of an Existing Person*, 343-352, Humanoid Robots: New Developments, I-Tech Education and Publishing, Vienna, Austria, 2007.
- [13] H. Ishiguro, ‘Android Science: Toward a New Cross-Disciplinary Framework. Proceedings of Toward Social Mechanisms of Android Science’, *A CogSci 2005*, Workshop, 1–6, (2005)
- [14] D. Feil-Seifer, *Human Robot Interaction (Excerpt)*, online available under: http://www.researchgate.net/publication/236324876_Human-Robot_Interaction/file/72e7e51799114ec58f.pdf
- [15] N. Ranasinghe, A. Cheok, R. Nakatsu, and E. Do ‘Stimulating the sensation of taste for immersive experiences’, *Proceedings of the 2013 ACM international workshop on Immersive media experiences ACM*, New York, 29-34, (2013)
- [16] N. Ranasinghe, A. Cheok, and R. Nakatsu, ‘Taste/IP: the sensation of taste for digital communication’, *14th ACM international conference on Multimodal interaction*, ACM, New York, 409-416, (2012)
- [17] A. Legin, A. Rudnitskaya, Y. Vlasov, C. Natale, F. Davide and D’Amico, ‘Tasting of beverages using an electronic tongue, Sensors and Actuators’ *Chemical*, **1–3**, **44**, 291-296, (1997).
- [18] G. Ghinea, O.A. Ademoye, ‘Olfaction-enhanced multimedia: perspectives and challenges’, *Multimed Tools*, **55**, 601–626, (2011).
- [19] M. Mori. ‘The uncanny valley’ (K. F. MacDorman & N. Kageki, Trans.), *IEEE Robotics & Automation Magazine*, **19**(2), 98–100, (1970/2012)
- [20] H.A. Samani, R. Parsani, T.L. Rodriguez, E. Saadatian, K.H. Dissanayake and A. Cheok ‘Kissenger: design of a kiss transmission device’, *Designing Interactive Systems Conference. 2012 ACM*, New York, 48-57, (2012).
- [21] R. Krueger and M.A. Casey, *Focus Groups: A Practical Guide for Applied Research (3rd edition)*. Thousand Oaks, Calif: Sage. 2000.
- [22] Stewart: *Analyzing Focus Group Data* ‘Focus Groups’, Stewart, Shamdasani & Rook (eds.), 2007.
- [23] Morgan D., Krueger R. *When to use focus groups and why*, ‘Successful Focus Groups: Advancing the State of the Art’ Morgan D.(ed.), SAGE, London ,1993
- [24] F. Zeller, *Focus Group Research on sensitive topics: Setting the agenda without setting the agenda* ‘Successful Focus Groups: Advancing the State of the Art’ Morgan D.(ed.), SAGE, London, 1993
- [25] M. Jowett and G. O’Toole ‘Focusing researchers’ minds: Contrasting experiences of using focus groups in feminist qualitative research’, *Qualitative Research*, **6**, **4**, 453-472, (2006).
- [26] U. Kuckartz, *Computer-assisted analysis of qualitative data* (U. Kuckartz, Trans.). A. Diekmann (eds.), Methoden der sozialforschung (pp. 453-478). Wiesbaden, Germany: VS-Verlag. 2006
- [27] P. Mayring, ‘Qualitative Content Analysis’, *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, **1**, **2**, (2000)
- [28] D. Herbenick, M. Reece, S. Sanders, B. Dodge, A. Ghassemi, & J. D. Fortenberry, ‘Prevalence and characteristics of vibrator use by women in the United States: Results from a nationally representative study.’ *The journal of sexual medicine*, **6**(7), 1857-1866, (2009).
- [29] M. Reece, D. Herbenick, S. Sanders, B. Dodge, A. Ghassemi, & J. D. Fortenberry, ‘Prevalence and characteristics of vibrator use by men in the United States’ *The journal of sexual medicine*, **6**(7), 1867-1874, (2009).